Understanding productivity trends in UK tax collection[1]

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Abstract: Productivity is defined as the ratio of outputs to inputs. When applied to the public sector, productivity becomes a key performance indicator that shows how efficiently public resources are employed in providing public services. Until not too long ago productivity in the public sector was assumed to be flat as outputs were given the same price as the cost of producing them. Recent methodological approaches suggest to measure outputs directly in order to count with realistic productivity estimates. Empirical public sector productivity studies are still in its infancy. This paper proposes to contribute to this new field by analysing productivity changes in the area of tax collection. This is a key area in which, as of 2008, the central government spent over £3.3bn in administrative resources and which provided more than £450bn in revenue, involving the processing of more than 24 million different tax forms. We contend that key changes in public management approaches in the UK during the last twenty years may be related to the observed changes in tax collection productivity. Specifically, we posit that the transition from the so called New Public Management (NPM) approach to Digital Era Governance (DEG) one, which focuses on the re-centralisation of government agencies and the reliance on Information and Communication Technologies (ICT) to simplify administrative processes, must have had an impact on productivity. We test this assumption by analysing productivity trends during an eleven year period from 1997 to 2008. We find some support for our assumption, showing that the transition to DEG in the early 2000s led to a drop in productivity, which recovered its upward trend towards the mid 2000s. We also analyse how ICT and outsourcing expenditure contributed to productivity increases and we also explore how service quality levels have performed during the analysed period. We conclude by highlighting that recent productivity increases should be coupled with higher service quality levels in order to improve customer experience with this public service. Overall, this paper shows the potential to expand this analytical framework to other public services to expand our comparative knowledge of performance across the UK public sector.

Introduction:

Economists have long argued that productivity is a fundamental performance measure that allows to assess how efficiently resources are being employed to produce different goods and services. When applied to the public sector, productivity entails a significant accountability aspect as it shows how efficiently public resources are spent to provide key public services. Until not too long ago, productivity in the public sector was assumed to be constant as public sector outputs were given the same price as the cost of producing them. This was the simplest solution to the problem that non-market outputs, as the ones typically produced by the public sector, do not have a price as normal market outputs do. Since the late 1990s, growing concern from the UK government to count with more realistic public sector productivity estimates, coupled with recommendations in the UN System of National Accounts 1993 (SN93) to move away from the input=output approach, led the Office of

National Statistics (ONS) to propose a new methodology for measuring public sector productivity in which outputs should be directly measured by using cost-weighted activity measures.[2] In short, the new method proposed by the ONS since the early 2000s, and later recommended by the 2005 Atkinson Review, consists of elaborating a cost-weighted index of outputs based on the actual number of specific activities performed by any given public sector department and then divide this output measure by an index of the total costs involved in producing such outputs. By proceeding in this way, it is possible to observe how productivity ratios vary over time.

Adopting a public administration perspective, we posit that, in order to understand productivity change, it is critical to take into account the effect of changing public sector management approaches that have been significant in the UK public sector during the last twenty years. Specifically, we contend that the transition from the New Public Management (NPM) approach that focused on principles of dissagregation, competition and incentivisation to a Digital Era Governance (DEG) one, focusing on the re-centralisation of government departments and the use of Information and Communication Technologies (ICTs) to simplify administrative procedures, has had an impact on productivity ratios across government departments.

Our main working hypothesis is that the change from NPM to DEG has had an immediate negative effect on productivity as the re-centralisation of activities and the heavy investment in ICTs may have not paid off immediately and a certain "adaptation" time must have been necessary to fully profit from organisational and ICT changes. In adopting this working hypothesis we claim that the change from NPM to DEG approaches in public administration could be paralleled to that of a scientific paradigm, in which one dominant

[2] See Pritchard, A. 2003. "Understanding Government Output and Productivity." *Economic Trends*, 596. and Pritchard, A. 2002. "Measuring Productivity Change in the Provision of Public Services". NIESR Conference paper, London, 19th November. See also the series of ONS empirical analyses on public sector productivity that can be retrieved at:
http://www.statistics.gov.uk/about/data/methodology/specific/PublicSector/output/default.asp

approach in the early 1990s - New Public Management - started to have problems to find solutions to practical problems, such as coordinating an increasing number of government agencies that often tended to duplicate tasks. Therefore, a rival and new paradigm would start to evolve in the early 2000s, - Digital Era Governance - which would progressively offer better solutions to the problems left unsolved by the previous approach. Thus, a dip in productivity should be expected during a certain transitional period. However, we contend that in the medium term productivity ratios should adopt a positive trend as the investment in ICT and outsourcing of non-core activities to the private sector starts to pay off.

We test our main working hypothesis by analysing the area of tax collection. There are good reasons to analyse productivity trends in this area. First, it is through taxation that central government collects most of the monetary resources to function; taxation is therefore key for the normal running of the modern state. Second, total central government administrative expenditure in this area is around £3.3bn, which amounts to 1 percent of total central government managed expenditure.[3] Third, changes from the NPM to the DEG public management approach in the UK central government have been significant in this area. In this sense, since the late 1990s there has been a progressive re-centralisation of activities into the two tax collection departments: the Inland Revenue (which was responsible for the collection of direct taxes) and Her Majesty's Excise and Customs (which was in charge of collecting indirect taxes). Finally, following the recommendations of the O'Donnell Review (2004), the two departments were merged in 2005 to form a combined tax and customs department, Her Majesty's Revenue and Customs (HMRC). All these organisational changes since the late 1990s were accompanied by a significant investment in ICT and the outsourcing of non-core activities to the private sector through Private Finance Initiative contracts (PFI). This paper aims to illustrate how these changes have affected the performance of tax collection by

[3] Data according to PES database 2008

analysing productivity estimates since the mid 1990s. While a longer period of time for the analysis would have been certainly desirable, the availability of output data has determined the chosen time period.

This paper follows the method to measure outputs and productivity suggested by the ONS and the Atkinson Review (2005) as closely as possible. However our focus is different to that of some recent publications from government departments and the ONS (ONS 2008; DWP 2008). In this sense, we aim to explore the factors that drive productivity change in this area and also to put such changes within the broader context of the implications of the switch from NPM to DEG management approaches. We believe that such empirical approach is missing in much of the public sector productivity work that has been done so far. To this end, this analysis includes a qualitative assessment of the key management changes in this area during the last twenty years; which illustrates the underlying change of public management approaches. In addition, our models also analyse how ICT, consulting and outsourcing expenditure are related to output levels. Our analysis is based on original data directly provided by Her Majesty's Revenue and Customs (HMRC)[4].

This paper is organised as follows. After this brief introduction, the second section discusses the implications of the switch from NPM to DEG management approaches in the public sector with a specific focus to the area of tax collection area. Here, we identify the key DEG elements that may have an impact on output and productivity and we relate such factors to the broad productivity literature. This section also includes a qualitative assessment of the main administrative changes that took place in the tax collection area in the last twenty years. Such assessment serves as a base for our quantitative productivity results, which are presented in the third section. Here, we also analyse the relationship between key indicators such as ICT, consulting and outsourcing expenditure and output levels. In addition, in order to assess

[4] We thank the members of the HMRC's Knowledge Analysis and Intelligence (KAI) team.

whether increasing productivity levels in recent years have been accompanied by an improvement in quality, we provide some data on the submission of tax returns electronically on a yearly basis. Finally, we highlight the convenience of adopting new configurational methods to empirically test the possible combination of causes that are driving productivity change in this as well as in other public sector areas. The last section summarises our findings and it concludes by suggesting to expand our analytical framework to other key public services' areas.

Public management changes, tax collection developments and productivity:

Two different paradigms can be identified in the domain of UK public administration in the last twenty years: New Public Management (NPM) and what some authors call Digital Era Governance (DEG). While different definitions are generally used, some scholars identify NPM with the adoption of business managerial principles typical of the 1980s such as a strong customer service orientation (Pollit 1993). Other authors prefer to define NPM as a new organisational culture identified with the use of a repertoire of more individualistic and less hierarchical organizational control mechanisms. More recent approaches have attempted to systematise these divergent definitions by claiming that NPM can be described as a theory of management based on importing concepts from (relatively) modern business practices and public-choice influenced theory (Dunleavy 1997; Dunleavy et al. 2005). Scholars from this latter approach argue that NPM has three chief integrating themes: dissagregation, competition, and incentivisation.

Dissagregation entails the splitting up of large public sector hierarchies in different agencies, much in the same way in which private corporations have split into multi-firm structures, to achieve wider and flatter hierarchies internally. In the UK public sector this

principle led, for example, to the division of former large departments in different agencies as part of the "Next Steps" agencification program.

Competition involves the introduction of purchaser/provider separation into public structures so as to create more choice from potential providers. A related aspect of competition is the outsourcing of activities, particularly IT, to the private sector.

Incentivisation implies introducing the widely accepted practice in the private sector of rewarding staff according the achievement of specific performance targets. This performance-related pay principle also applies to the payment for outsourced activities.

While the three key components of NPM, as described above, meant to render the public sector more "agile" and respond better to citizens' needs, the empirical evidence in some industrialised countries throughout the 1990s shows signs of the opposite. One of the key problems identified by some studies has been the excessive "agencification" that led to a high degree of fragmentation in public service areas, notably in the UK (James 2003; Talbot 2004). The excessive "agencification" phenomena increased overall administration costs significantly because of the duplication of processes among agencies belonging to a similar public service area and it also complicated citizens' experiences in dealing with public organisations. Similarly, the massive outsourcing of key areas such as government IT systems to the private sector led to some significant IT disasters in the late 1990s, for example in the UK. Finally, some empirical research shows that performance payment schemes promoted by NPM practices have not led to focused and business-like organisations but to rather heterogeneous ones with conflicting organisational identities (Skalen 2004).

In response to the problems of NPM management practices, towards the early 2000s there has been a gradual but consistent change towards a new paradigm that some authors described as Digital Era Governance (DEG) (Dunleavy et al. 2005). Contrary to NPM, the main themes of DEG are the re-integration of formerly scattered agencies belonging to a same

public service area, the re-designing of structures and processes around the needs of users or clients to tackle the excessive duplication and complication of processes produced by NPM practices, and the digitalisation of administrative processes moving most of them online to simplify client contact with a given public service organisation. It is worth noting, however, that the significant re-integration of agencies in newly-created departments must not be seen as a return to the large bureaucracies of the past but as more efficient and customer-oriented organisations that aim to overcome the problems created by NPM reforms (Dunleavy et al. 2005). By centralising functions but, at the same time, re-structuring processes taking into account clients' needs and moving processes online, these new organisations may be able to increase their performance significantly because of the potential reductions in costs, while also helping to improve customer experience.

Both NPM and DEG management changes have been common in the administration of tax collection during the last twenty years. Until 2005, this activity was the responsibility of two departments: the Inland Revenue, in charge of collecting direct taxes, and Her Majesty's Customs and Excise, which was in charge of collecting import duties, indirect taxes as well as processing imports and exports.

Figure 1 describes the main management changes that have taken place in the area of tax collection during the last twenty years and it aims to illustrate the impact of the two aforementioned public administration paradigms on this area over time. On the bottom axis, general elections are marked with broken lines. On the vertical axis there are six general areas where changes have taken place: legislative agenda; implementation and change of specific programmes; organisational architecture; market outsourcing developments; digital / IT developments; and general / contextual changes such as the impact of the Gershon Report.

As it is possible to see in Figure 1, the 1990s saw relatively few changes at the legislative level and at the programme level. Looking at the architecture and programme level,

in 1993 the Conservative government introduced the 10 year change programme – a key objective of which was to reduce the number of staff at Inland Revenue by 13,000 and by 2002 to reduce total staff to 42,000. Another change worth mentioning during this period was the introduction of self-assessment for income tax and corporation tax in April 1996.

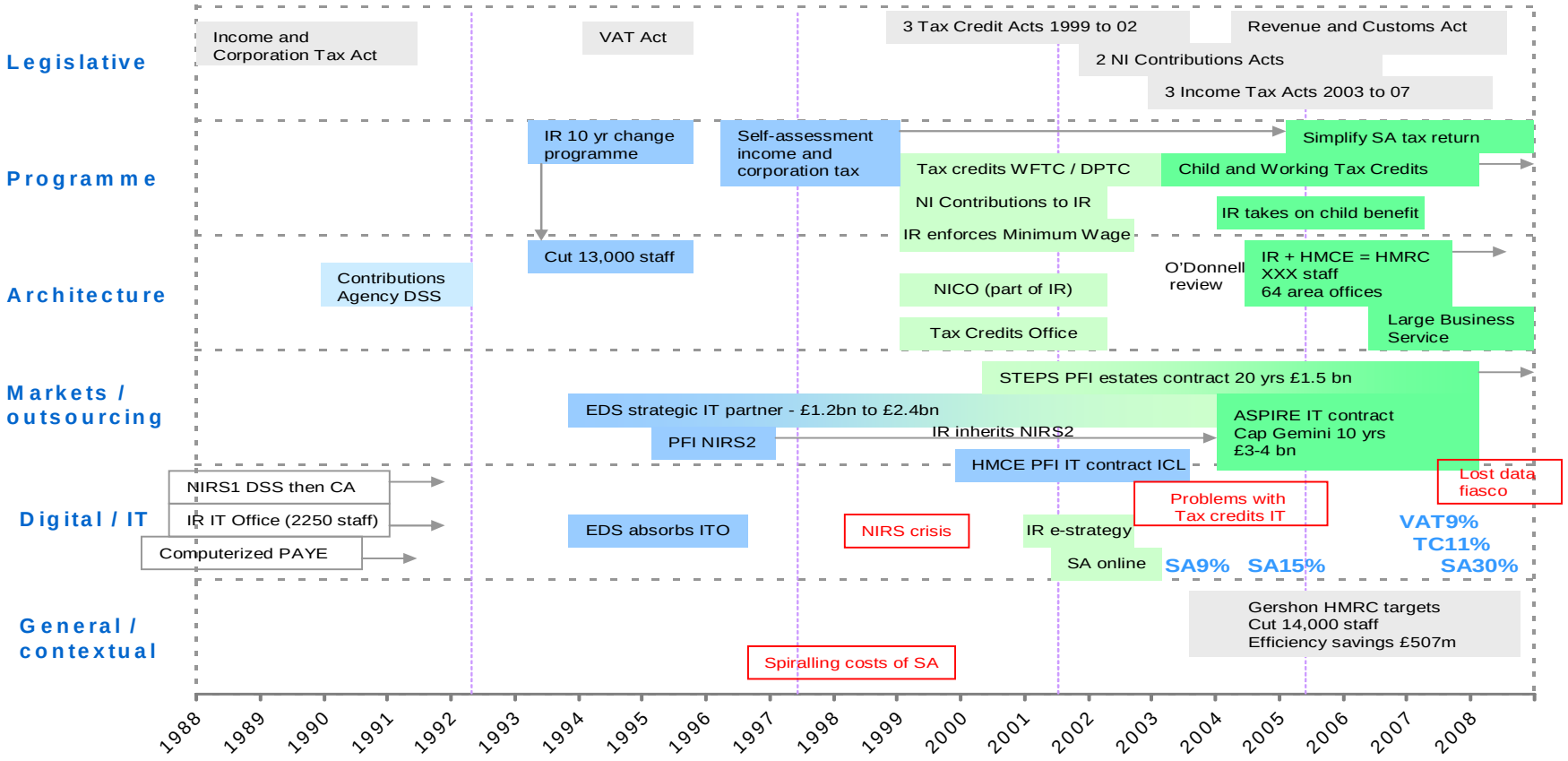
More significant changes at the architecture and programme level would take place after the New Labour government took over in 1997. These changes would be in line with the expectations of the Digital Era Governance literature. In 1999, a major functional (and identity) change took place at IR when it absorbed a range of different functions and began to act as a transfer agency as well as a revenue collection agency. First, IR was given the responsibility of paying tax credits. Second, IR absorbed the Contributions Agency (CA), which up until then had been an autonomous agency within the Department of Social Security (DSS). The Agency was renames as National Insurance Contribution Office. IR had collected NI on behalf of DSS for years, but now took responsibility for assessment, maintenance, and collection of NI contributions.

At the market / outsourcing and digital / IT levels, an important event during the early 1990s, consistent with the expectations of the NPM literature, was the major outsourcing of Inland Revenue's entire IT systems to EDS in 1994. IR had a big in-house IT capacity (ITO) nearing 2250 staff. In 1994 EDS signed the biggest ever government IT contract (up to that point) worth initially around £1.4 billion but climbing over the course of the contract to £2.4 billion. As part of the contract, EDS absorbed all Inland Revenue IT staff. However, since the start of the contract there would be operational problems with IR computer systems, with officials complaining about downtime, delays in fixing problems, etc (See Dunleavy et al. 2006, p. 142). The relationship with EDS would be further damaged due to the 2004/05 controversy about the overpayment of Tax Credits.

Regarding HMCE, even though it was an early user of IT, by the late 1990s its systems were perceived to be quite dated. To address this problem, in 1999, HMCE signed a Private Finance Initiative (PFI) contract with ICL/Fujitsu for the management of the departmental IT infrastructure, which included the provision of a desktop system. The contract was initially held up on concerns about the Japanese banks providing the funding (Dunleavy et al 2006, 144). This delay explains why by 2002, the desktop system was perceived to be outdated, with a significant proportion of staff lacking access to the Internet (Dunleavy and Margetts 2002: 70).

With the transfer of the Contributions Agency, Inland revenue also inherited the National Insurance Recording System PFI contract. This contract would also be subject to controversy due to the failures in the system in 2000/01, which led to the underpayment of thousands of pensioners.

Figure 1: Main changes in Tax collection administration in the last twenty years



In 2005, following the recommendations of the O'Donnell Review (2004), the two major tax agencies IR and HMCE were merged. One of the stated goals of the merge was to simplify processes and economize resources as both agencies were dealing with tax collection. Such move was consistent with the principles of DEG, as it aimed at improving overall customer experience and use resources more effectively. In fact, one of the consequences of the merge was the progressive reduction of FTE staff in the coming years and the termination of the former IR contract with EDS for the provision of IT infrastructure in December 2004, which was awarded to Capgemini under the ASPIRE contract, on grounds of being more cost-effective. The same happened with the former HMCE contract with ICL/Fujitsu, which was also absorbed within the ASPIRE contract. Independent evaluations h highlight the utility of re-centralising these formerly separated IT contracts and they point out how the HMRC could not only save costs but also develop a strategic relationship co-partnering with a single supplier and having a better overall accountability for IT delivery (NAO 2006).

Another important aspect at the outsourcing level, was the award of the STEPS PFI contract to Mapeley for the administration and development of office accommodation for both IR and HMCE in 2001. While the contract was subject to some controversy regarding the financial situation of Mapeley, independent assessments judged that the contract had been beneficial for both departments (NAO, 2004).

In sum, the picture that emerges from this qualitative assessment of the administrative changes in the area of tax collection is one of progressive centralisation of functions since the late 1990s, which would culminate with the merge of the former two tax collection departments in a combined revenue and customs body. In addition, the newly created HMRC seems to have learned from previous administrative problems regarding the management of its IT systems, and it has entered into a much productive relationship with its unique IT

provider. At the same time, it has decided to maintain the outsourcing of non-core activities such as the development and management of the departmental state through the STEPS PFI contract.

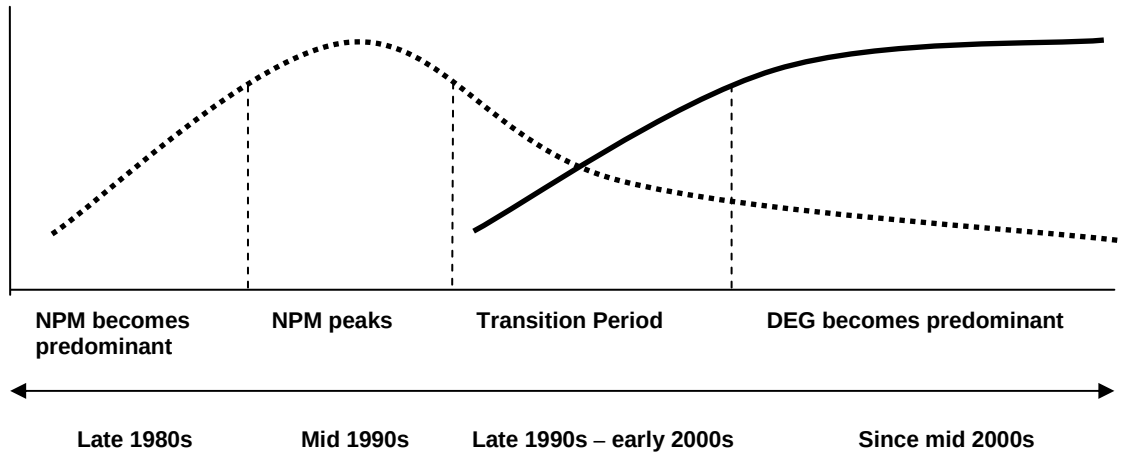
We highlight that the changes that took place in recent years, as described above, are consistent with the expectations of the Digital Era Governance literature. In addition, we claim that the IT and organisation failures of the late 1990s and early 2000s must have affected productivity negatively. However, we hypothesize that the significant investments in ICT, consulting and outsourcing of non-core activities that took place since the early 2000s, together with the lessons learned from early policy failures, must have affected productivity positively only very recent years, as some "transition" period must have been needed to fully profit from the changes introduced that aimed to solve the problems faced by the New Public Management approach.

In elaborating this hypothesis we claim that the change from NPM to DEG could be paralleled to that of a paradigm change (Kuhn 1962). According to many observers, the situation in the UK public sector in the late 1990s was characterised by fragmentation and duplication of activities and some policy disasters. Given these problems, public sector managers started to explore new ways to address the need to make public organisations more efficient. Following Kuhn (1962), this can be paralleled to a situation in which a dominant approach, or paradigm, that has been in use so far to address specific issues starts to show problems or failures to provide solutions, which paves the way to the development of a new paradigm. These repeated failures, also described as "tradition-shattering" activities, start to question the usefulness of the current paradigm and lead eventually to a "scientific revolution" and a change of paradigm (Kuhn 1962, 6).

Thus, the basic insight from Kuhn's theory is that as a certain approach has problems to explain and provide solutions to real-world problems, scientists start to explore and adopt

alternative ways that are completely different to the dominant paradigm so far. This is why the change of one paradigm to another is a "transitional" but at the same time "creative" moment. As the new paradigm is gaining acceptance, old practices from the previous paradigm may still take place. This points towards a certain "transitional" period in which the performance of organisations may behave erratically as a result of the different changes being adopted. Figure 2 below illustrates the switch from NPM to DEG in terms of paradigm change.

Figure 2: The transition from NPM to DEG



As figure 2 shows, it is during the transition period when productivity levels may have a trendless pattern as there is a certain overlap of activities that are related to the two competing paradigms. In the UK, this period coincided with the coming to power of the New Labour government in 1997 and lasted until the early 2000s. In effect, once in power, the new government focused on merging agencies belonging to similar areas and on investing heavily in new ICT systems and outsourcing non core activities to the private sector. The expectation of such moves was to increase efficiency and overall productivity levels.

Such expectation for increasing output and productivity as a consequence of investing in new technologies and outsourcing is also supported by the literature on public sector

productivity. In general, this literature has hypothesized and found that significant investments in IT systems, the use of external consultants to provide expert advice on organisational changes and the outsourcing of some activities to the private sector have a positive impact on output and productivity.

Lehr and Lichtenberg (1998) found a positive relationship between IT capital and output in their study of a number of US government agencies from 1987 to 1992. More recent studies have used alternative approaches such as utilising specific measures of IT use and testing whether these measures are statistically related to partial productivity estimates (Garicano and Heaton 2007). In this latter case, IT is found to be positively related to productivity and output growth only when interacted with some measure of organisational change.

In the private sector, some studies have employed specific measures of organisational changes with panel data of firms across a number of years and they have found that these measures are statistically and positively related to partial or total factor productivity measures (Caroli and Van Reenen 2001; Bloom et al 2005). In the public sector recent research has also employed specific measures of organisational changes to a panel of police departments and it has found that they are also positively related to partial productivity and output estimates (Garicano and Heaton 2007).

Finally, regarding the contributions of the outsourcing of activities (contracting out) to the private sector, scholars highlight that the transfer of activities to the private sector is highly beneficial for public sector organisations since it produces large savings with virtually no loss of quality or reduction in service levels (Holzer et al. 2004). It is worth noting, however, that DEG management approaches do not contemplate outsourcing in the same way that NPM management approaches did. Rather, the focus in recent years in the UK has been

on outsourcing non-core activities such as maintenance and development of office accommodation, while switching towards the in-house provision of key services, such as IT.

Following the insights of the public management and productivity literature we expect to find that changes in productivity in the tax collection area will be related to the changing public management approaches. In this sense, we posit that the move from NPM towards DEG management principles in the late 1990s may have led to a temporary decline in productivity due to the re-integration of formerly scattered agencies and the creation of a new centralised tax and customs department in 2005 (Her Majesty's Revenue and Customs - HMRC). However, we contend that these changes, together with the significant investments in improving IT systems, must have paid off over time and productivity should have improved in recent years. This expectation is not only based in the theoretical literature described above but also on some case studies of tax collection authorities' performance in the UK and other countries that point out the significant gains in productivity that may be expected from "DEG type" management changes; especially those related to the filing of taxes online (Beynon-Davies 2005; Vasconcellos and Rua 2005).

Measuring productivity in tax collection and the factors related to it:

To measure tax collection productivity we followed the recommendations of the Atkinson Review (2005). This entailed using output volumes on the different indirect and direct taxes processed by Inland Revenue and HMCE previous to 2005 and by the HMRC there after. A detail of the taxes included in the analysis is laid out in Table A1 in the appendix. Data availability issues led us to employ an eleven year period, which starts in financial year 1997/98. In selecting this output measure we aimed to be consistent with the recommendations of the Atkinson Review (2005), which makes a strong case for measuring public sector outputs directly (See Atkinson, 2005, pp.12-14).

The measurement of output and productivity in the public sector entails some difficulty as public sector outputs do not have a price. In this sense, principle A of the Atkinson review (2005) suggests to "follow a procedure parallel to that adopted in national accounts for market output"(p. 36). However, the Review immediately notes the problem that in the public sector, outputs do not have a price. Therefore, it suggests is to utilise "direct output measures"(p. 37) by considering the different type of activities performed in each given public service and weight them according to the share of administration costs involved in producing them. This direct output measure that considers the different activities performed in any public service area is then the core of the methodology recommended by ONS and the Atkinson Review. Our approach aims to follow this approach as closely as possible.

We claim that in selecting the returns processed for each type of tax as our measure of output we are considering the key activities performed in the tax collection area; which focus on processing taxes to collect revenue for the state. While alternative approaches would suggest to consider customer satisfaction levels and the number of complaints processed, we contend that the main recommendation of the Atkinson Review when measuring productivity is to focus on the core activities for each public service. In addition, data on customer satisfaction levels and complaints is not available for a long enough period of time and has not been consistently collected in the same way, which makes year-on-year comparison difficult.[5]

An alternative way to try to measure outputs in the tax collection area is by considering the amount of tax collected. While the Atkinson review specifies that the number of returns and not the tax collected should be considered, we run a model using the deflated amount of tax collected as a measure of output. The results are shown in Figure A1 in the

[5] HMRC and its predecessors, the HMCE and Inland Revenue collected some data on complaints solved. Given the different ways in which these data were collected and the limited number of years for which they are available, we suggest to treat them carefully for year-on-year comparison. These data, for the available years, can be found in Table A2 in the Annex.

Annex, and the ratio of tax collected to input costs resembles closely that of the productivity ratios presented the rest of this paper. We therefore conclude that our tax return output measure, while it can be certainly subject to criticism, constitutes the best output measure for this study and it conforms with the main recommendations of the Atkinson Review.

Data for tax output volumes for different taxes analysed (as outlined in Annex 1) were then weighted according to the to the share of total administrative costs involved in processing each type of tax. We calculated the weights using data on administrative costs from 1998/99. Data availability issues related to the way data were reported in the two tax collection agencies determined our choice of this year in order to calculate the output weights.

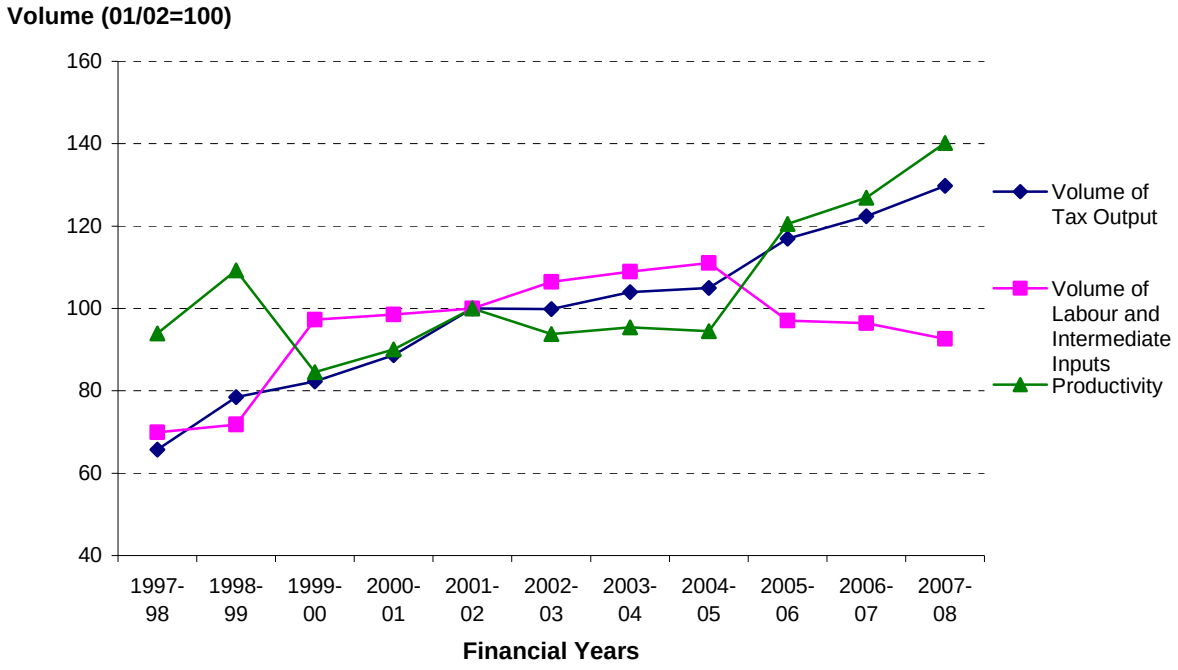
Productivity studies normally rely on total factor productivity (TFP) or labour productivity figures. TFP is a very aggregate measure because it considers all administration costs, divided in labour, procurement and capital consumption.

One problem for the present study in calculating a measure similar to TFP, is that data on the capital stock and its estimated lifespan and depreciation (necessary for the calculation of capital consumption) is not available from public sources in a way in a which it could be identified for the tax collection effort. An additional complication is that prior to 2005, tax collection was performed by two separate departments. However, the available data from HMCE and Inland Revenue departmental reports (and since 2005, from HMRC) allows us to identify total labour and intermediate costs involved in the processing of taxes.

As we explain below, in the rest of this paper we privilege the use of labour productivity because of being a specific productivity measure that can be comparable across different public services as it employs a common “denominator” (the number of FTE personnel). However, as a preliminary step in our productivity analysis and given the availability of data on labour and intermediate costs, we have estimated productivity ratios by dividing our cost-weighted output measure by an index based on the deflated labour and

intermediate costs. While we acknowledge that this measure is not the same as a total factor productivity (TFP) one, we claim that it provides a good overall picture that gets closer to the idea of measuring TFP. Figure 3 shows the data of this analysis.

Figure 3: Labour and Intermediate Inputs Productivity



Source: Authors' elaboration upon data from HMCE, IR, HMRC

Data from Figure 3 allows us to already identify some interesting patterns which provide some evidence for the expectations laid out in the previous section of the paper, especially in regards of the impact from the change of paradigm as illustrated by Figure 2 and the discussion related to it. In effect, from 1997-98 up to 2000-01, there are significant upwards and downwards changes in productivity without a clear tendency. This, we posit, illustrates that during the "transitional" period from NPM to DEG there were mixed strategies that responded to each of the alternative paradigms. Moreover, from 2000-01 to 2004-05 there is a downward productivity trend that is related to the increased costs of the changes related to the re-centralisation of activities which, as explained in our qualitative assessment, included

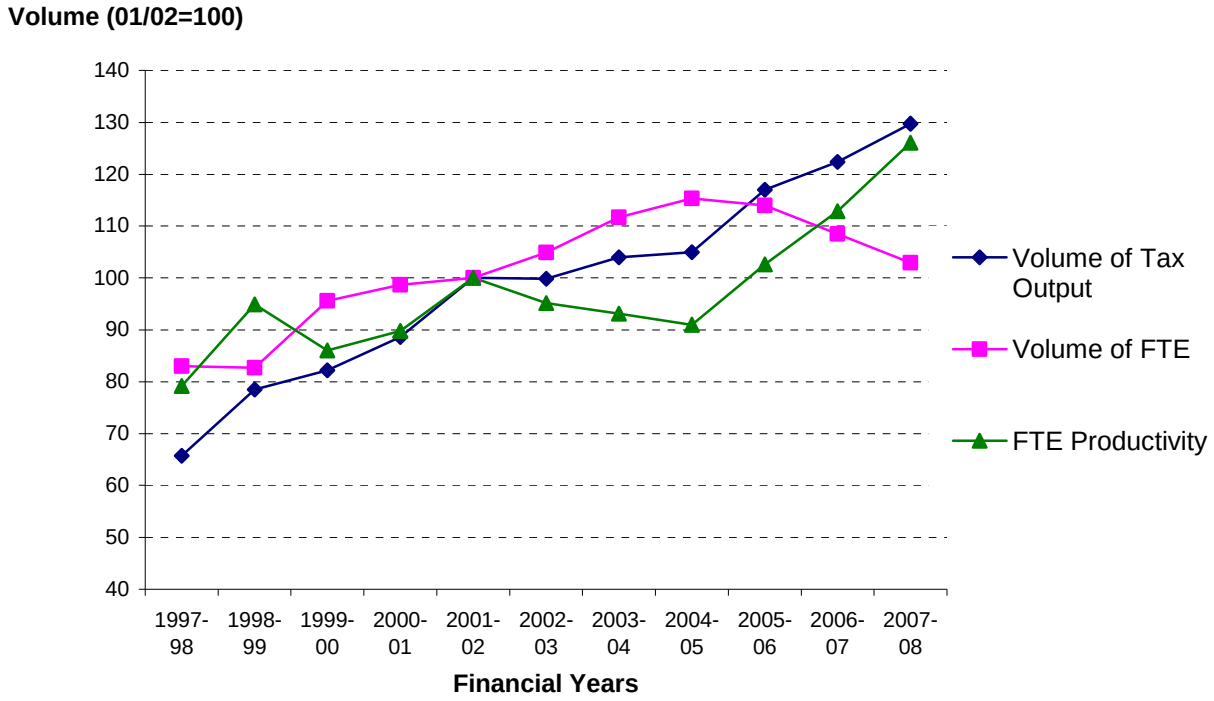
the absorption of agencies, significant investments in new ICT and the creation of a combined revenue and customs department in 2005. In this sense, the data shows that since 2005-06 there is a significant increase in productivity, which indicates that the changes of the early 2000s have started to pay off.

As discussed before, to provide a less aggregate and comparable measure of productivity, we calculated labour productivity ratios for the same period under analysis. In choosing labour productivity for the rest of our analysis we are following practitioners and scholars' advice that when confronting data from different departments or statistical bodies it is better to rely on labour productivity estimates to avoid biases due to different assumptions on capital depreciation (Sargent and Rodrigez 2000, 4). This is particularly the case when calculating productivity estimates that are aimed at being comparable across different areas, which is one of the main purposes of this study.

Labour productivity was then calculated as the ratio of the weighted volume of tax output to the volume of FTE personnel. To this end, we relied on publicly available sources from the departments involved to accurately identify the number of FTE personnel for the tax

collection activity. For both indexes, we used financial year 2001/02 as our base year.

Figure 4: FTE Tax Collection Productivity



Source: Authors' elaboration upon data from HMCE, IR, HMRC Departmental Reports

Data from Figure 4 shows a trend that is similar to that anticipated in Figure 3. In this sense, it is possible to roughly identify three periods. The first one since financial year 97/98 until financial year 01/02 is marked by a trendless productivity pattern. The second period from financial year 01/02 to financial year 04/05 is characterised by an important decline. Finally, a striking increase in FTE productivity has taken place since financial year 04/05. We posit that management changes in the tax collection area, which are linked to the transition from NPM to DEG type changes, may explain these interesting trends.

The first period can be linked to the situation in the tax collection area towards the late 1990s described in our qualitative assessment, which was characterised by the significant failures of "NPM inspired" movements such as the outsourcing of ICT systems. In 1997, IR started to encourage the filing of certain taxes online, most notably income tax self assessment and value added tax (VAT). However, this initial effort did not pay off

immediately as the levels of e-filing would remain low for some time. Much of the failure with e-filing and with Inland Revenue IT systems is related to the problems that arose around the outsourcing of Inland Revenue ICT systems to EDS in 1994 and that were described in the previous section (for more details, see Dunleavy et al. 2006, p140). Similar problems arose in HMCE, which up to 1999 run its own ICT systems and that then decided to outsource its provision and maintenance under a PFI contract to ICL/Fujitsu. As described in our previous section, the contract was subject to delays and when it was rolled out, it turned out to be based on outdated ICTs rather than web-based ones. These initial failures with ICT contracts, and the resulting lack of update in IT infrastructure, may explain the overall stagnant and trendless pattern of labour productivity during this period. Overall, as illustrated also in our aggregated productivity analysis in Figure 3, this period illustrates that during the "transitional" period of switching from NPM to DEG, productivity lacked a specific trend.

The second period indicated by our data, starting in financial year 2001/02 is characterised by a significant decline in productivity mainly due to a rather stagnant evolution of the volume of taxes collected and a steady increase in the number of FTE staff. We posit that this trend may be related to some re-centralisation changes that took place in this area during this period. First, the absorption by Inland Revenue of the Contributions Agency and parts of the Benefit Agency in 2001, as described in our previous section, led to an increase of roughly 10,000 FTE staff year on year. Second this period was still marked by the ICT failures described before that would significantly affect the processing of Self Assessment income tax and the payment of the newly introduced tax-credits. The latter problems were particularly important from 2003 to 2005, when IR incurred in significant overpayments (See Dunleavy et al. 2006, p.143). All these developments hit the tax collection effort, and this is reflected in our data as the volume of output barely increased during this period. Thus, an increasing number of FTE staff due to the re-centralisation process started in the early 2000s

and the stagnant levels of tax returns processed determined a significant decrease in productivity levels, which declined by ten percentage points in the 01/02 to 04/05 period. This period also included the merge of the two tax collection departments in 2005, following the recommendations of the O'Donnell Review (2004). Also, towards the end of this period, the Inland Revenue, and then the newly created HMRC, would re-focus their efforts towards re-negotiating its problematic IT contracts. Such move, as explained in the previous section, would end up with the three outstanding IT related contracts renegotiated in a much better beneficial terms for the department.

Finally, the period started in 04/05 highlights a remarkable increase in productivity. We posit that this may be related to the fact that, after the policy disasters of the early 2000s there was some learning, as shown by the re-negotiation of the IT contracts, and investment in ICT has started to pay off. In fact, our figures show that the volume of tax collection recovered almost twelve percentage points in the period 04/05 to 05/06. At the same time, after the merge of the two tax collection departments in 2005, the newly created HMRC has made steady progress to comply with the recommendations of the Gershon report (2004) on reducing FTE personnel. In this sense, staff numbers fell by more than 9,000 between financial years 04/05 and 07/08.

Another factor that, according to some observers, has helped to achieve efficiency savings and boost productivity in recent years is the implementation, since 2005, of the Pacesetter programme that is aimed at boosting productivity and quality levels. The programme has three components: Lean implementation, Operational Management (OM) and Senior Leadership (SL). The aim of the Pacesetter programme is to:

- Redesign service delivery processes so as to eliminate waste and variability and maximise flexibility. This will improve productivity, quality and reduce lead time.

- Change current management processes to create appropriate management infrastructure to sustain improvements.
- Change mindsets and behaviours of leaders and front line staff to support the new systems and deliver continuous improvement.

Through the work with ad-hoc consultants, HMRC has implemented the Pacesetter programme in ten major processing sites. Pacesetter has a top-down and bottom up approach to improving performance and the Lean and OM/SL elements are very linked together. Lean drives performance from the processes up into the wider organisation. OM/SL drives performance from the leadership team down into the wider organisation. Official reports from HMRC state that the Pacesetter programme has received strong acceptance from managers and frontline staff but those reports do not provide evidence yet of increases in productivity or service quality levels (See HMRC 2007). In this sense, our analysis can be seen as a first piece of evidence showing the impact that actions such as the Pacesetter programme have had in recent years on tax collection productivity.

To better test the contribution of the use of consultants, investments in ICT and outsourcing to output and productivity we assembled expenditure data on ICT, consulting and outsourcing (via Private Finance Initiative projects) and we analyse how they are related to output levels. In so proceeding, we are following the insights of the public sector productivity literature that argues that such factors are positively related to output and productivity.

We must acknowledge, however, that compiling such data was not without its complications due to the way that data are reported, the lack of it for some years, and the fact that prior to 2005 it was necessary to compile the information from two different departments. An additional complication we had to deal with, was to separate the proportion of these data that, in the case of HMCE, corresponded only to the tax collection effort of this agency. We

achieved the latter by employing percentage weights based on total administration costs for each activity within HMCE.

Table 1 shows the data on ICT, consulting and PFI expenditure. To be consistent in differentiating the different expenditure categories, we included payments for PFI contracts that were related to the provision of ICT infrastructure and services under the category for ICT expenditure. Therefore the reported values for PFI corresponds to all those contracts related to the provision of office accommodation. Table 1 shows data on ICT, consulting and PFI expenditure as percentage of total administration expenditure for the tax collection effort.

Table 1: ICT, Consulting and PFI expenditure (as percentage of total administration expenditure)

Year	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
ICT	8.1	N/A	N/A	9.1	10.2	9.2	10.5	13.0	13.6	16.3	17.0
Consulting	N/A	N/A	2.3	2.2	1.7	2.0	2.3	3.0	2.9	2.0	1.9
PFI (non-ICT)	0.1	0.3	0.4	2.8	5.6	5.4	5.3	5.5	7.7	7.3	7.4

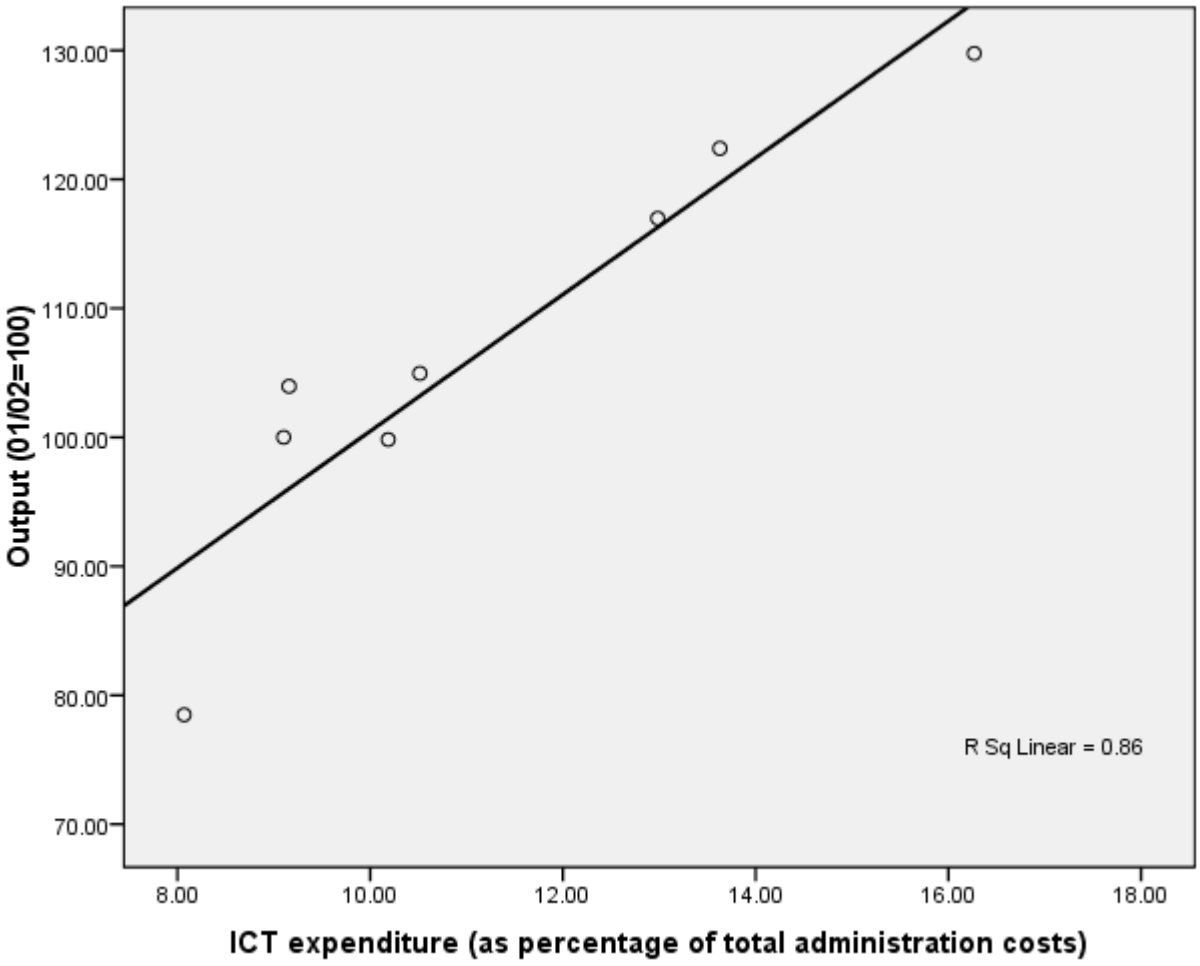
Source: Authors' elaboration upon data from HMCE, IR, HMRC Departmental Reports

Data from Table 1 confirms our main working hypothesis that significant DEG type management changes have taken place in the tax collection area as indicated by increasing expenditure levels in ICT, consulting and PFI. At a first glance, we can see that expenditure on ICT and PFI contracts related to accommodation have tended to increase during the whole analysed period. By contrast, expenditure on consulting peaked around 2005. We interpret that this trend is consistent with the fact that on the wake of the merger of the former two tax agencies (IR and HMCE) there was a need to get expert advice on how to better proceed with such merge.

While there seems to be a general pattern in data from Table 1 indicating that increasing expenditure in these three categories has increased at the same time as

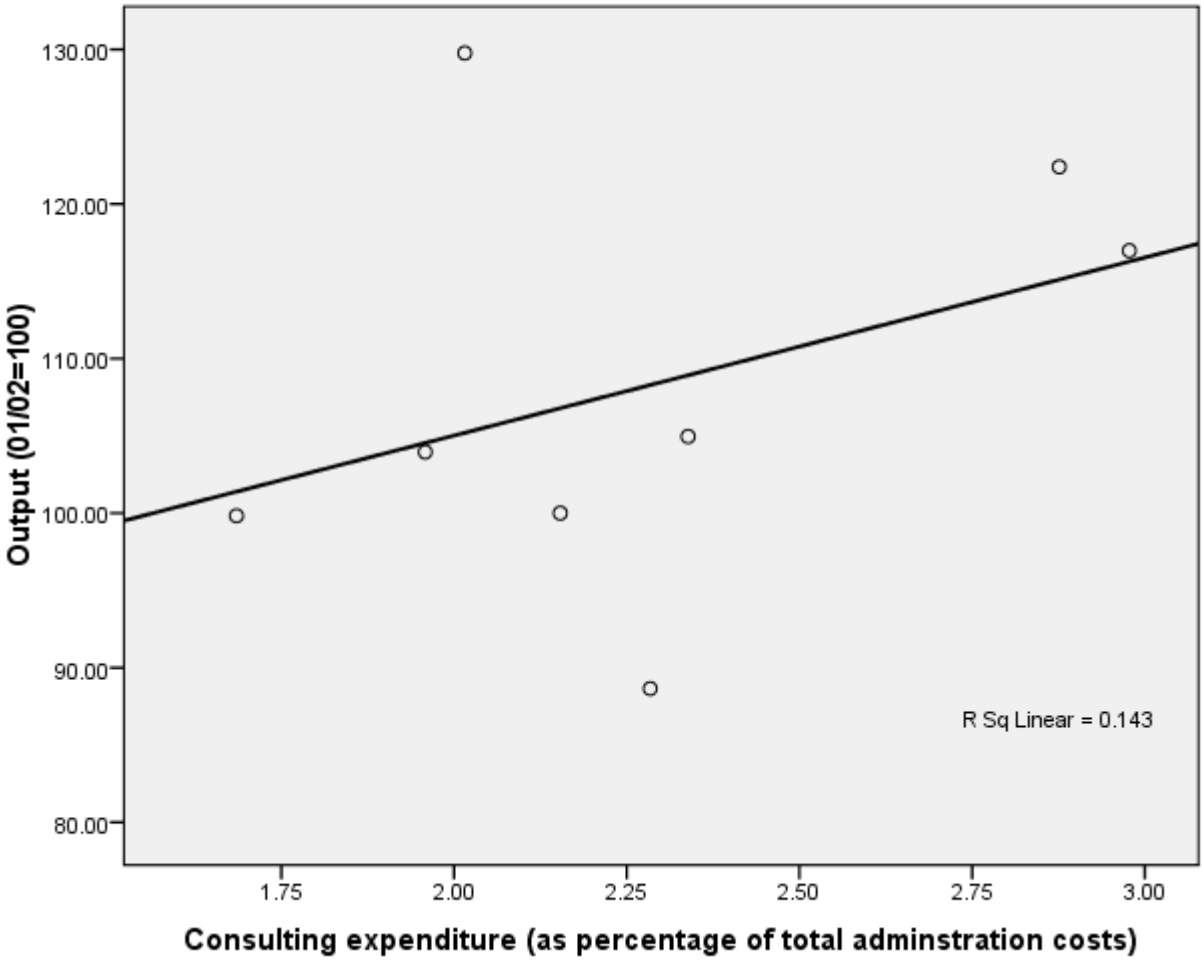
productivity, we are still a bit short of being able to show a systematic pattern between these categories and our calculated productivity estimates. We can, however, analyse how each of the three different factors are related to output levels by calculating the regression line that would fit the plotted values of each factor and the observed output levels. We claim that while we must be cautious on the interpretations of such results due to the limited number of observations and the lack of controlling for different factors, the results can provide some initial evidence of the relationship between the aforementioned factors and output levels. ICT, consulting and PFI (non-IT) expenditure was lagged by one year to allow for the expectation that investments in these three critical factors will start to pay off after a certain time. Figures 5 to 7 shows the data from these analyses.

Figure 5: ICT expenditure (lagged) and Output



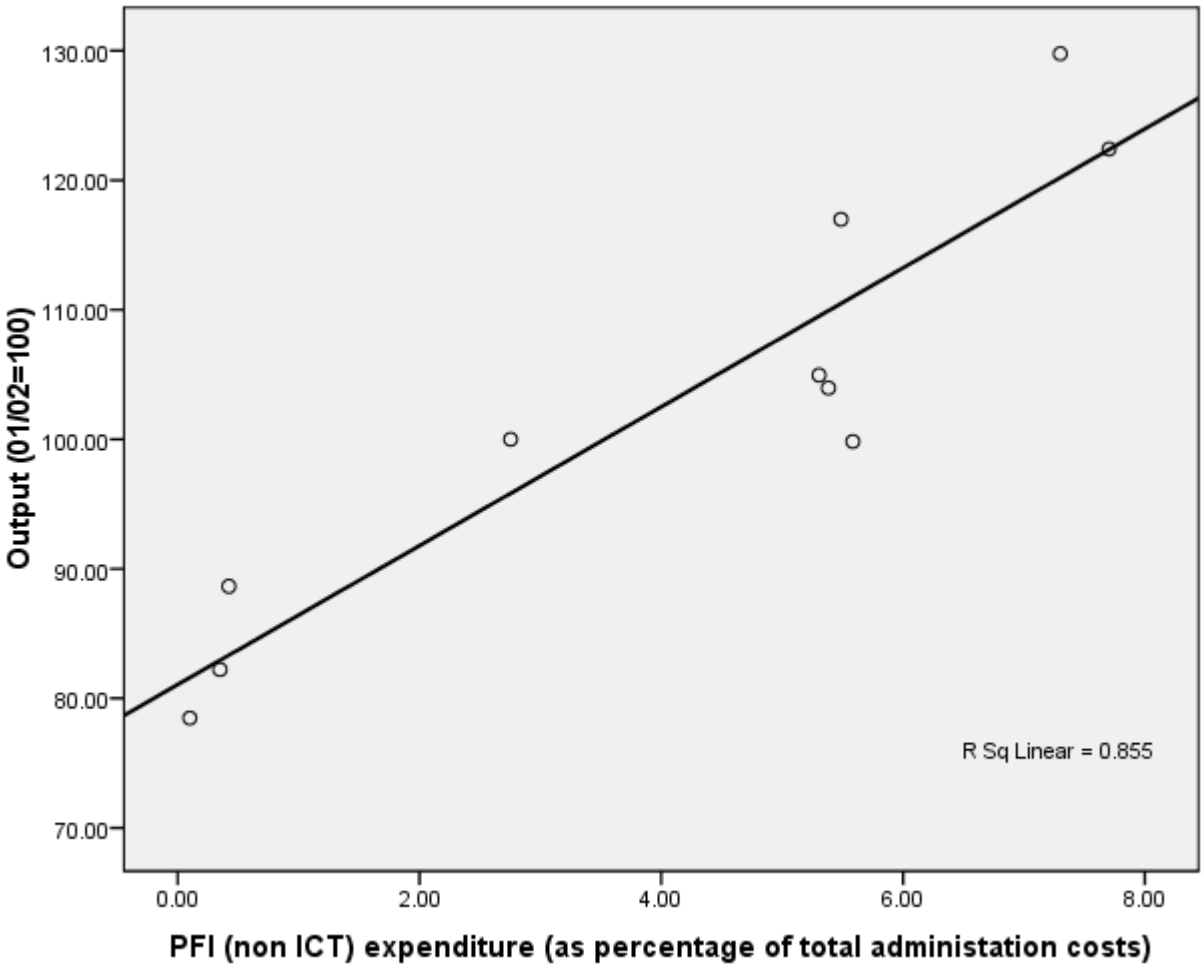
Source: Authors' elaboration based on data from HMRC

Figure 6: Consulting expenditure (lagged) and Output



Source: Authors' elaboration upon data from HMCE, IR, HMRC Departmental Reports

Figure 7: PFI (non-IT) (lagged) and Output



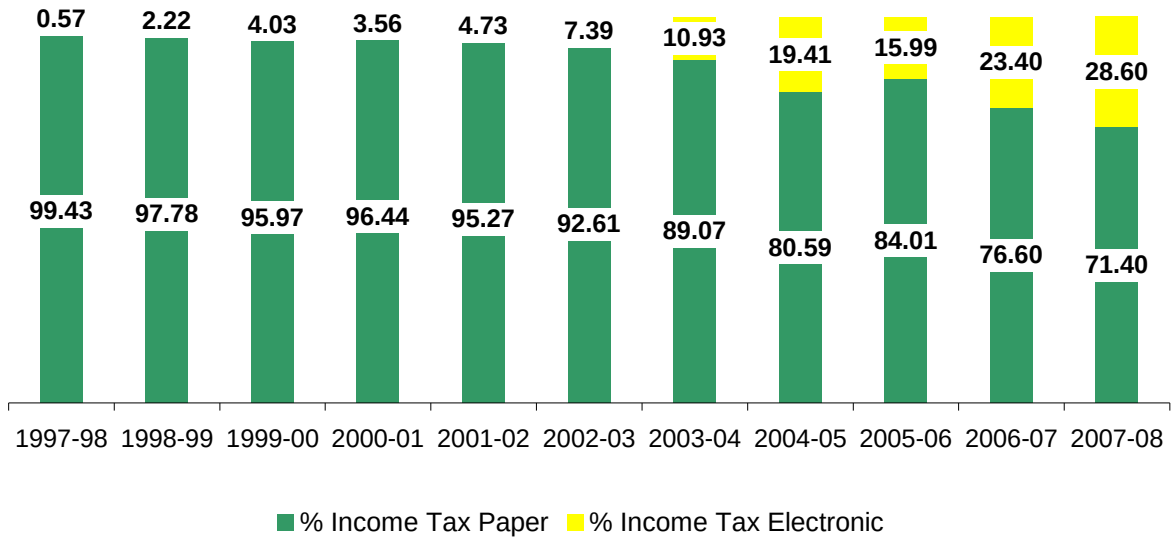
Source: Authors' elaboration upon data from HMCE, IR, HMRC Departmental Reports

The analysis from the results reported in figures 5 to 7 show some interesting patterns that lend support to our original hypothesis. Thus, we find that both IT and PFI expenditure related to office accommodation, are strongly related to our calculated output levels, with the regressions explaining between 80 and 86 percent of the variation in output levels. By contrast, while there is a positive relationship between consulting expenditure and output levels, the regression explains only slightly over 14 percent of the variation in output levels. We contend that this may be related to the fact that, as our results partially show, expenditure on consultants may be more important during transitional times marked by significant organisational changes that tend to be associated with low output levels.

Overall, our results indicate that the area of tax collection is marked by significant increases in output and productivity levels in recent years and that some key factors identified in the Digital Era Governance and public sector productivity literature, such as expenditure on ICT and on outsourcing of non-core activities are positively and strongly related to output levels. However, we wonder whether this positive trend has been matched by improvements in the overall quality of the service provided in this public service. According to some service management literature, productivity in services does not entail only to save costs in the production of outputs, as it is typical in the manufacturing sector (Gronroos 2007). In this sense, this literature argues strongly for achieving high productivity and service quality levels. For example, an indication that service quality levels are improving would be that the number of complaints are being reduced and that customers express high levels of satisfaction.

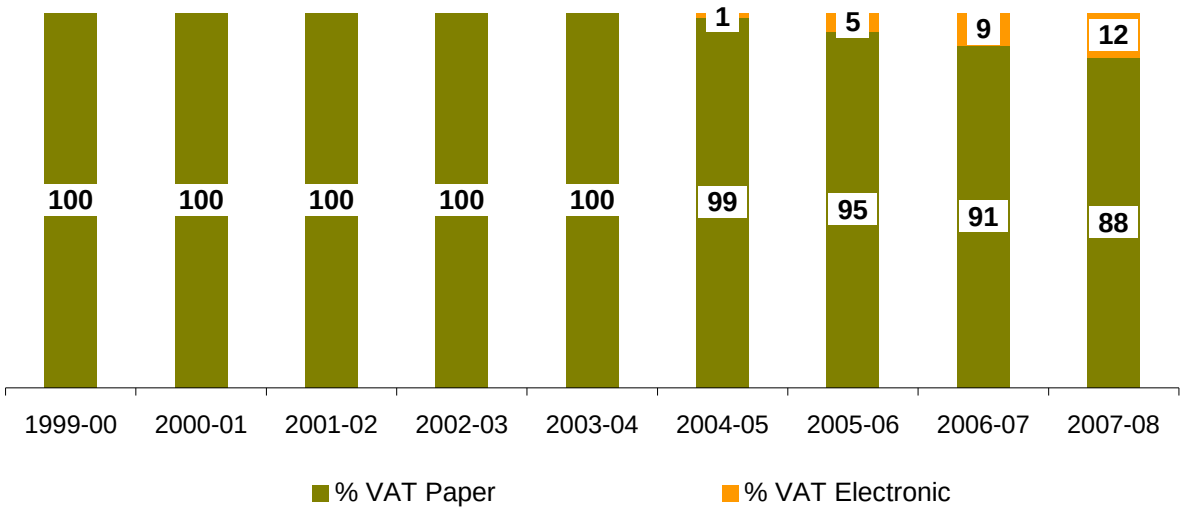
While we can think of different aspects of service quality that could be applied to the tax collection area, one relatively easy aspect to measure is the proportion of returns that are filed electronically every year. Tax administrations around the world and many public sector scholars and practitioners argue that e-filing is more likely to improve customer experience as filing can be done faster than with traditional methods (West 2005). Also, e-filing can save a significant amount of resources, contributing to higher productivity. Thus, we have assembled data on the percentage of self-assessment income tax and value added tax (VAT) returns that have been filed online and in paper forms over years. Figures 6 and 7 show these data for our analysed period.

Figure 8: Online and Paper based Income Tax



Source: Authors' elaboration based on HMRC data

Figure 9: Online and paper based VAT



Source: Authors' elaboration based on HMRC data

Data from figures 8 and 9 show that even though progress to move the filing of income tax and VAT online has been important in recent years, there is yet more to be done and potential productivity gains to be obtained. The case of the UK with tax e-filing shows then a similar pattern to that of other industrialised countries, in which the full potential of e-filing is still not completely exploited (West 2005, 82). Thus, we conclude that while

productivity levels have improved significantly in recent years, much rests to be done to try to increase service quality levels.

Overall, we argue that the analytical framework employed in this paper could be applied to other key public services. In addition, while our research has found interesting and significant relations between key factors highlighted in the public sector productivity literature and output levels, one aspect that could be explored further in future comparative productivity analyses is the combination of factors that are consistently related with high output and productivity levels. In this sense, there is some management and productivity literature in the public sector that highlights the possibility of multiple conjunctural causality to explain increases in productivity (Fiss 2007; Kogut et al 2004). While conventional quantitative techniques can address the expectation of multiple conjunctural causality by employing interaction terms, such techniques require a large number of observations to prevent from obtaining biased coefficients. This may be a problem in research designs as the ones that are typical in productivity analyses in the public sector due to the limited number of observations.

However, new configurational techniques based on Boolean algebra such as Fuzzy Set Qualitative Comparative Analysis (fsQCA) may prove particularly suited to test the assumption of multiple causality in relatively small N research designs (Ragin 2000, 2008). In this method, cases are conceived as configurations of different set membership values for the causal conditions and the outcome of interest. The method then proceeds by identifying the combination of causes that are consistently related to the outcome of interest (i.e.: the combination of causes that are sufficient for the outcome to occur). In addition, because it is based on Boolean algebra, fsQCA is not constrained by research designs characterised by a small number of observations.

One drawback of this method is its lack of temporality, which makes it not suitable for yearly time-series data. However this apparent drawback could be solved if an investigator were to conceive cases as periods, which would need to be theoretically defined.[6] In a research design like the one presented in this paper, this could be done by considering two-year periods. While the number of observations would be two low to run a fsQCA analysis only for the tax collection area, this could be done if we were to include data from other public services such as customs and social protection. Proceeding in this way would allow us to comparatively and systematically assess the contribution of the key different factors pointed out in this paper (ICT, consulting and outsourcing) to increased productivity. Moreover, employing this method would allow us to test the expectation for multiple conjunctural causality.

We conclude by highlighting the feasibility of applying our approach to the measurement of output and productivity in the public sector. We argue that this key performance measure will be of use to public sector practitioners in coming years as they are faced with the challenge of maintaining or improving service quality while having to utilise resources more efficiently. In addition, while some literature had originally pointed out the challenges involved in measuring output and productivity in the public sector (Hatry 1978; Boyle 2006;), we have shown that by adapting the suggestions of the specialised literature in an innovative way it is possible to obtain reliable productivity estimates. Moreover, we have also shown that there is room to apply innovative social science techniques to better assess the possible combination of factors that lead to increased output and productivity.

[6] For such an innovative way of including temporality in QCA analysis, see Metelits, C. (forthcoming). "Applying QCA to Rebel Group Behavior: Does Control over Resources Matter?" Political Research Quarterly.

Conclusion

This paper analysed productivity trends in the area of tax collection relying on original data provided by HMRC. As such, this is one of the first empirical studies to employ the methodology for the measurement of output and productivity as recommended by the ONS and the Atkinson review (2005) to the tax collection area. In addition, this paper adopted a public management approach and it showed how changes in productivity over time were related to the transition from two different management approaches: New Public Management (NPM) and Digital Era Governance (DEG).

While NPM focuses on dissagregation, competition and incentivisation, DEG focuses on the re-integration of formerly scattered agencies belonging to a same public service area, the re-designing of structures and processes around the needs of users or clients to tackle the excessive duplication and complication of processes produced by NPM practices, and the 'digitisation' of administrative processes moving most of them online to simplify client contact with a given public service organisation. Key developments associated to the adoption of DEG practices are the investment in ICT to enhance the provision of services online, the use of professional consultants to streamline business process and the outsourcing of non-core activities such as the design and development of office accommodation. Thus the expectation of the DEG literature is that departments will experience significant increases in productivity.

The change from the NPM to the DEG paradigm, implied a certain "transitional" period which was marked by the introduction of new DEG inspired practices while some of the NPM ones were still in place. This had an effect on output and productivity and, as our data shows, there was a trendless productivity pattern since the end of the 1990s until the early 2000s. Then, from 2000 to 2005, productivity experienced a significant decline. We posit that this decline is related to the effect of some policy failures and also to the changes in the machinery of government related to the centralisation of activities that would culminate,

in 2005, with the merge of the two former tax collection agencies, Inland Revenue (IR) and Her Majesty's Customs and Excise (HMCE), to form a combined tax and customs department: Her Majesty's Revenue and Customs (HMRC).

Such re-centralisation of government bodies performing similar activities is consistent with the predictions of the DEG literature, which stipulates that there is a trend among industrialised countries to re-centralise activities in order to eliminate the duplication of similar tasks, streamline business practices and move some services online to achieve efficiency gains and improve customer experience. Our analysis shows that these changes have paid off as tax collection productivity has adopted an upward trend since 2005.

To further support our analysis we assembled data on ICT, consulting and PFI-accommodation expenditure and these data show that ICT and PFI expenditure are strongly related to output levels. We posit that such trend provides further evidence to our expectation that DEG type changes lead to increased levels of output and productivity. These results also provide support for the expectations of the public sector productivity literature that has found that ICT and the outsourcing of non-core activities contributes positively to output and productivity levels.

However, when considering service quality levels, our analysis shows that much rests to be done in order to improve customer experience and being able to achieve further efficiency gains. Levels of online tax filing have grown significantly only in recent years. If more people are able to submit their taxes online, this may help to improve their levels of satisfaction with this service as the department will be able to process the returns and refunds faster.

Overall, we contend that our results provide reliable and significant insight to scholars and practitioners interested in the measurement of output and productivity in the tax collection area. As such, this analysis expands our understanding of the performance of public

services and it provides a useful methodological approach. Scholars and practitioners alike may find the insights of this paper useful as, in the middle of a global recession, the UK public sector faces the need to achieve high efficiency gains while maintaining, or even increasing, service quality levels.

We conclude by pointing out the necessity to expand this research approach to other areas to be able to gain even more theoretical insight. One possible avenue is to comparatively and systematically assess the combination of factors that lead to increased output and productivity levels. In this sense, we posit the convenience of adopting new configurational methods such as fsQCA, which allows to perform such assessment in the context of a small number of observation. This new approach also allows to test the assumption for multiple conjunctural causality advanced in some recent management and productivity literature. In sum, we claim that this paper shows the prospect for a fruitful research agenda focused on comparatively understanding productivity in the public sector.

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APPENDIX:

Table A1: Direct and Indirect Taxes considered in the productivity analysis

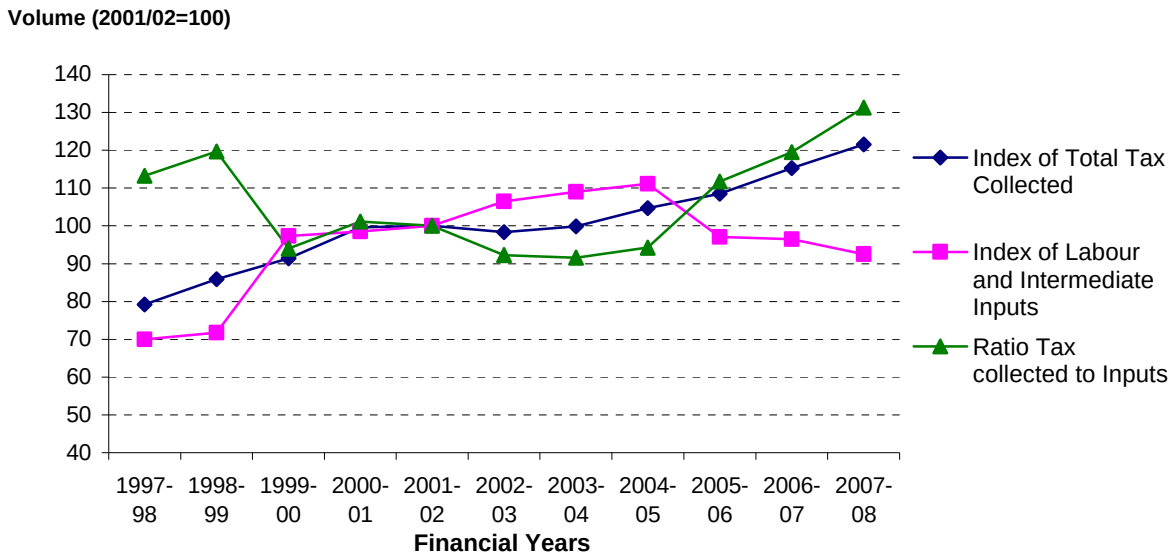
Income Tax (includes Self Assessment Total and Number of PAYE live schemes)
Corporation Tax
Capital Gains Tax
Inheritance Tax
VAT
Excise Duties & other indirect taxes

Table A2: Tax complaints*

2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
39,033	45,562	44,095	64,969	89,214	79,430	40,395

***:** Data corresponds to complaints for the Tax Credit Office, direct, indirect and stamp taxes. Data for 2001-02 to 2004 are not directly comparable for the rest of the years. Data for 2007-08 is not directly comparable for the rest of the years as there was a change in the data collection methodology.

Figure A1: Ratio of Ammount of Tax Collected to labour and intermediate inputs*



*Note: We considered the same taxes as in the rest of the paper. Data was deflated using 1997/98 as the base year and it was then adjusted using the same cost weights employed in the rest of the paper